STANDARDS DEVELOPMENT BRANCH OMOE
3 6936 00000 1939

DRINKING WATER SURVEILLANCE PROGRAM

PETERBOROUGH WATER SUPPLY SYSTEM

ANNUAL REPORT 1990

TD
380
.P48
1992
MOE

Ontario
Environment
Environnement

Copyright Provisions and Restrictions on Copying:

This Ontario Ministry of the Environment work is protected by Crown copyright (unless otherwise indicated), which is held by the Queen's Printer for Ontario. It may be reproduced for non-commercial purposes if credit is given and Crown copyright is acknowledged.

It may not be reproduced, in all or in part, part, for any commercial purpose except under a licence from the Queen's Printer for Ontario.

For information on reproducing Government of Ontario works, please contact Service Ontario Publications at copyright@ontario.ca

TD
380
.P48
1992

Peterborough water supply
system : annual report 1990.

19367

ISSN 0840-514X

PETERBOROUGH
WATER SUPPLY SYSTEM

DRINKING WATER SURVEILLANCE PROGRAM

ANNUAL REPORT 1990

HAZARDOUS CONTAMINANTS
COORDINATION BRANCH
135 ST. CLAIR AVENUE WEST
TORONTO, ONTARIO M4V 1P5

SEPTEMBER 1992

Cette publication technique
n'est disponible qu'en anglais.

Copyright: Queen's Printer for Ontario, 1992
This publication may be reproduced for non-commercial purposes
with appropriate attribution.

PIBS 1973
Log 92-2302-281

EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

PETERBOROUGH WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Peterborough water supply system is a conventional treatment plant which treats water from the Otonabee River. The process consists of coagulation, flocculation, sedimentation, filtration, fluoridation and disinfection. Sulphur dioxide is added to remove the excess chlorine in the disinfection process. This plant has a rated capacity of 104.1 x 1000 m^3/day. The Peterborough water supply system serves a population of approximately 61,300.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Peterborough water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

	SCAN	SITE RAW TESTS	RAW POSITIVE	RAW %POSITIVE	TREATED TESTS	TREATED POSITIVE	TREATED %POSITIVE	SITE 1 TESTS	SITE 1 POSITIVE	SITE 1 %POSITIVE	SITE 2 TESTS	SITE 2 POSITIVE	SITE 2 %POSITIVE
	BACTERIOLOGICAL	17	13	76	6	0	0	5	0	0	6	2	33
	CHEMISTRY (FLD)	18	18	100	36	36	100	60	60	100	71	70	98
	CHEMISTRY (LAB)	132	109	82	127	100	78	182	162	89	218	201	92
	METALS	144	32	22	144	36	25	230	91	39	276	111	40
	CHLOROAROMATICS	70	0	0	70	0	0	70	0	0	84	0	0
	CHLOROPHENOLS	12	0	0	12	0	0	.	.	.	.	.	.
	PAH	102	0	0	102	0	0	.	.	.	0	0	0
	PESTICIDES & PCB	184	0	0	185	0	0	107	1	0	128	1	0
	PHENOLICS	6	2	33	6	3	50	.	.	.	.	.	.
	SPECIFIC PESTICIDES	56	0	0	56	0	0	5	0	0	6	0	0
	VOLATILES	174	0	0	174	18	10	145	15	10	174	18	10
TOTAL		915	174		918	193		804	329		963	403	

DRINKING WATER SURVEILLANCE PROGRAM

PETERBOROUGH WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Peterborough water treatment plant in January, 1987. Previous annual reports have been published for 1987, 1988 and 1989.

PLANT DESCRIPTION

The Peterborough water supply system is a conventional treatment plant which treats water from the Otonabee River. The process consists of coagulation, flocculation, sedimentation, filtration, fluoridation and disinfection. Sulphur dioxide is added to remove the excess chlorine in the disinfection process. This plant has a rated capacity of 104.1 x 1000 m^3/day. The Peterborough water supply system serves a population of approximately 61,300.

The sample day flows ranged from 45.5 x 1000 m^3/day to 57.0 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing

samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were reported above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of

the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 6 of 17 treated and distributed water samples with a maximum reported value of 24.0°C.

CHEMISTRY (LAB)

Colour in drinking water may be due to the presence of natural or synthetic substances as well as certain metallic ions.

Colour exceeded the ODWO Maximum Desirable Concentration of 5 HZU in 4 of 6 water samples from one distribution site with a maximum reported value of 17.5 HZU.

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 17 of 17 treated and distributed water samples with a maximum reported value of 108.0 mg/L.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. The ODWO Maximum Acceptable Concentration for turbidity is 1.0 Formazin Turbidity Units (FTU).

The laboratory turbidity exceeded the Maximum Acceptable Concentration in 1 treated water sample at 1.4 FTU, this result was not confirmed by the more reliable field turbidity result.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 9 of 17 treated and distributed water samples with a maximum reported value of 450.0 ug/L.

ORGANIC

CHLOROAROMATICS

Hexachlorocyclopentadiene was reported at positive levels in 2 distribution system water samples with a maximum value of 550 ng/L. The United States Environmental Protection Agency has an ambient water quality criteria for hexachlorocyclopentadiene of 206,000 ng/L.

The results of the other parameters in the chloroaromatic scan showed that none were detected.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and

dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 17 treated and distributed water samples analyzed with a maximum level of 162.5 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Peterborough water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1

PETERBOROUGH WATER TREATMENT PLANT

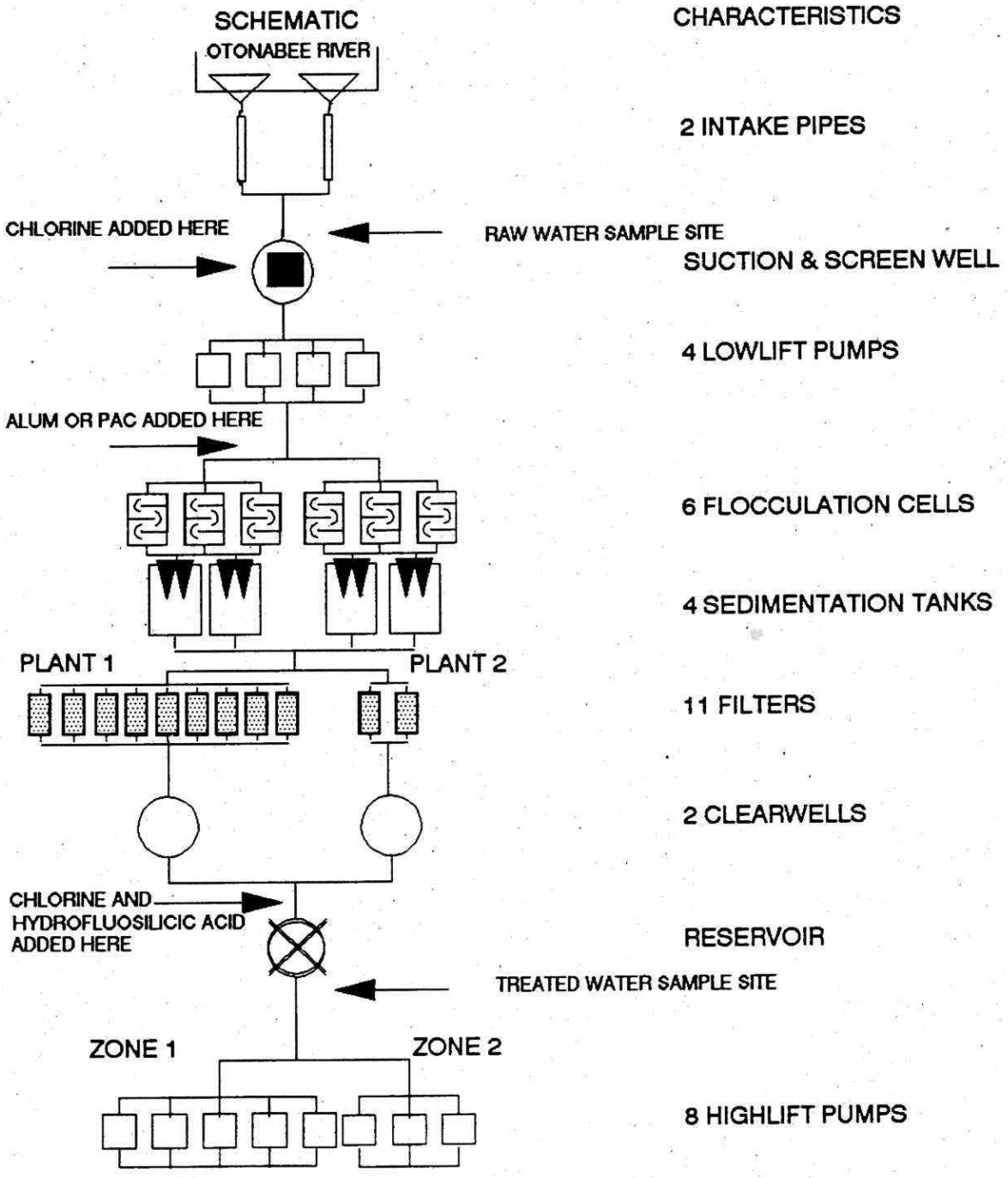

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #:	220000497
PLANT NAME:	PETERBOROUGH WSS
DISTRICT:	PETERBOROUGH
REGION:	CENTRAL
DISTRICT OFFICER:	JACQUES L. BOURQUE
UTM #:	177143254912925
PLANT SUPERINTENDENT:	MR. WAYNE MANLEY
ADDRESS:	1867 ASHBURNHAM DR PETERBOROUGH ONTARIO K9J 6Z5 (416)748-9300
MUNICIPALITY:	PETERBOROUGH
AUTHORITY:	MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	5.000	(X 1000 M3)
DESIGN CAPACITY:	104.100	(X 1000 M3/DAY)
RATED CAPACITY:	104.100	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
PETERBOROUGH	60,801
WOODLAND ACRES SUBDIVISN	500

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
TURBIDITY	RAW WATER	DAILY
	SETTLED WATER	CONTINUOUS
	PLANT EFFLUENT	CONTINUOUS
PH	RAW WATER	3-5/WEEK
	SETTLED WATER	3-5/WEEK
	PLANT EFFLUENT	3-5/WEEK
CHLORINE RESIDUAL FREE	SETTLED WATER	CONTINUOUS
CHLORINE RESIDUAL TOTAL	PLANT EFFLUENT	CONTINUOUS
TEMPERATURE	RAW WATER	CONTINUOUS
FLUORIDE	PLANT EFFLUENT	CONTINUOUS
ALUMINUM RESIDUAL	RAW WATER	OCCASIONAL
	PLANT EFFLUENT	OCCASIONAL
ALKALINITY	RAW WATER	BIWEEKLY
	PLANT EFFLUENT	BIWEEKLY
HARDNESS	RAW WATER	BIWEEKLY
	PLANT EFFLUENT	BIWEEKLY
COLOUR	RAW WATER	2-3/WEEK
	SETTLED WATER	2-3/WEEK
	PLANT EFFLUENT	2-3/WEEK
ODOUR	RAW WATER	2/WEEK
	SETTLED WATER	2/WEEK
	PLANT EFFLUENT	2/WEEK
	DISTRIBUTION	2/WEEK
ALGAE COUNT	RAW WATER	WEEKLY

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGE (MG/L)				
			PRE CHLORINATION	COAGULATION	POST CHLORINATION	FLUORIDATION	DECHLORINATION
			CHLORINE	ALUM LIQUID	CHLORINE	HYDROFLUOSILICIC ACID	SULPHUR DIOXIDE
DATE	DELAY * TIME(HRS)	FLOW (1000M3)					
FEB 13	5.71	50.007	3.00	35.00	.30	.85	
APR 10	6.27	45.551	4.00	35.00	.10	.92	
JUN 12	5.00	57.050	5.00	31.00		.82	.03
AUG 14	5.34	54.052	5.50	32.00		.89	.35
OCT 10	5.32	53.688	4.50	16.00		.84	.28
DEC 11	5.71	50.006	4.00	14.00		.88	.26

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL												
FECAL COLIFORM MF	5	4	0	.	.	.	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	6	0	0	5	0	0	6	2	0
TOTAL COLIFORM MF	6	3	0	.	.	.	.	.	.	.	.	.
T COLIFORM BCKGRD MF	6	6	0	.	.	.	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	17	13	0	6	0	0	5	0	0	6	2	0
CHEMISTRY (FLD)												
FLD CHLORINE (COMB)	.	.	.	6	6	0	10	10	0	12	11	0
FLD CHLORINE FREE	.	.	.	6	6	0	10	10	0	12	12	0
FLD CHLORINE (TOTAL)	.	.	.	6	6	0	10	10	0	12	12	0
FLD PH	6	6	0	6	6	0	10	10	0	12	12	0
FLD TEMPERATURE	6	6	0	6	6	0	10	10	0	12	12	0
FLD TURBIDITY	6	6	0	6	6	0	10	10	0	11	11	0
*TOTAL SCAN CHEMISTRY (FLD)	18	18	0	36	36	0	60	60	0	71	70	0
CHEMISTRY (LAB)												
ALKALINITY	6	6	0	6	6	0	10	10	0	12	12	0
CALCIUM	6	6	0	6	6	0	10	10	0	12	12	0
CYANIDE	6	0	0	6	0	0	.	.	.	.	.	.
CHLORIDE	6	6	0	6	6	0	10	10	0	12	12	0
COLOUR	6	6	0	6	4	2	10	9	1	12	12	0
CONDUCTIVITY	6	6	0	6	6	0	10	10	0	12	12	0
DISS ORG CARBON	6	6	0	6	6	0	10	10	0	12	12	0
FLUORIDE	6	4	2	6	6	0	10	10	0	12	12	0
HARDNESS	6	6	0	6	6	0	10	10	0	12	12	0
IONCAL	6	6	0	6	6	0	10	10	0	12	12	0
LANGELIERS INDEX	6	6	0	1	1	0	2	2	0	2	2	0
MAGNESIUM	6	6	0	6	6	0	10	10	0	12	12	0
SODIUM	6	6	0	6	6	0	10	10	0	12	12	0
AMMONIUM TOTAL	6	6	0	6	1	2	10	2	5	12	7	2
NITRITE	6	2	4	6	0	2	10	0	7	12	2	10
TOTAL NITRATES	6	5	1	6	5	1	10	9	1	12	10	2
NITROGEN TOT KJELD	6	6	0	6	6	0	10	10	0	12	12	0
PH	6	6	0	6	6	0	10	10	0	12	12	0
PHOSPHORUS FIL REACT	6	0	3	6	4	2	.	.	.	.	.	.
PHOSPHORUS TOTAL	6	2	4	6	1	3	.	.	.	.	.	.
SULPHATE	6	6	0	6	6	0	10	10	0	12	12	0
TURBIDITY	6	6	0	6	6	0	10	10	0	12	12	0
*TOTAL SCAN CHEMISTRY (LAB)	132	109	14	127	100	12	182	162	14	218	201	14

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS												
SILVER	6	0	0	6	0	1	10	0	3	12	0	0
ALUMINUM	6	6	0	6	6	0	10	10	0	12	12	0
ARSENIC	6	0	6	6	0	6	10	0	10	12	0	12
BARIUM	6	6	0	6	6	0	10	10	0	12	12	0
BORON	6	0	6	6	0	6	10	0	10	12	0	12
BERYLLIUM	6	0	0	6	0	0	10	0	0	12	0	0
CADMIUM	6	0	0	6	0	0	10	0	2	12	0	2
COBALT	6	0	5	6	0	4	10	0	9	12	0	9
CHROMIUM	6	0	3	6	0	6	10	0	10	12	0	9
COPPER	6	2	4	6	0	4	10	10	0	12	11	1
IRON	6	0	6	6	0	4	10	1	7	12	8	2
MERCURY	6	0	1	6	0	0	.	.	.	.	.	.
MANGANESE	6	6	0	6	6	0	10	10	0	12	10	0
MOLYBDENUM	6	0	6	6	0	6	10	0	10	12	1	11
NICKEL	6	1	0	6	0	1	10	4	3	12	2	2
LEAD	6	0	6	6	0	3	10	10	0	12	11	1
ANTIMONY	6	0	6	6	0	6	10	3	7	12	9	3
SELENIUM	6	0	0	6	0	0	10	0	1	12	0	1
STRONTIUM	6	6	0	6	6	0	10	10	0	12	12	0
TITANIUM	6	2	4	6	3	3	10	3	7	12	5	7
THALLIUM	6	0	0	6	0	0	10	0	0	12	0	0
URANIUM	6	0	6	6	0	5	10	0	7	12	0	10
VANADIUM	6	0	6	6	6	0	10	10	0	12	9	3
ZINC	6	3	3	6	3	3	10	10	0	12	9	3
*TOTAL SCAN METALS	144	32	68	144	36	58	230	91	86	276	111	88
*TOTAL GROUP INORGANIC & PHYSICAL	294	159	82	307	172	70	472	313	100	565	382	102
CHLOROAROMATICS												
HEXACHLOROBUTADIENE	5	0	0	5	0	0	5	0	0	6	0	0
123 TRICHLOROBENZENE	5	0	0	5	0	0	5	0	0	6	0	0
1234 T-CHLOROBENZENE	5	0	0	5	0	0	5	0	0	6	0	0
1235 T-CHLOROBENZENE	5	0	0	5	0	0	5	0	0	6	0	0
124 TRICHLOROBENZENE	5	0	0	5	0	0	5	0	0	6	0	0
1245 T-CHLOROBENZENE	5	0	0	5	0	0	5	0	0	6	0	0
135 TRICHLOROBENZENE	5	0	0	5	0	0	5	0	0	6	0	0
HCB	5	0	0	5	0	0	5	0	0	6	0	0
HEXACHLOROETHANE	5	0	0	5	0	0	5	0	0	6	0	0
OCTACHLOROSTYRENE	5	0	0	5	0	0	5	0	0	6	0	0
PENTACHLOROBENZENE	5	0	0	5	0	0	5	0	0	6	0	0
236 TRICHLOROTOLUENE	5	0	0	5	0	0	5	0	0	6	0	0
245 TRICHLOROTOLUENE	5	0	0	5	0	0	5	0	0	6	0	0
26A TRICHLOROTOLUENE	5	0	0	5	0	0	5	0	0	6	0	0
*TOTAL SCAN CHLOROAROMATICS	70	0	0	70	0	0	70	0	0	84	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CHLOROPHENOLS												
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0	0	0	0
PAH												
PHENANTHRENE	6	0	0	6	0	0	.	.	.	0	0	0
ANTHRACENE	6	0	0	6	0	0	.	.	.	0	0	0
FLUORANTHENE	6	0	0	6	0	0	.	.	.	0	0	0
PYRENE	6	0	0	6	0	0	.	.	.	0	0	0
BENZO(A)ANTHRACENE	6	0	0	6	0	0	.	.	.	0	0	0
CHRYSENE	6	0	0	6	0	0	.	.	.	0	0	0
DIMETH. BENZ(A)ANTHR	6	0	0	6	0	0	.	.	.	0	0	0
BENZO(E) PYRENE	6	0	0	6	0	0	.	.	.	0	0	0
BENZO(B) FLUORANTHEN	6	0	0	6	0	0	.	.	.	0	0	0
PERYLENE	6	0	0	6	0	0	.	.	.	0	0	0
BENZO(K) FLUORANTHEN	6	0	0	6	0	0	.	.	.	0	0	0
BENZO(A) PYRENE	6	0	0	6	0	0	.	.	.	0	0	0
BENZO(G,H,I) PERYLEN	6	0	0	6	0	0	.	.	.	0	0	0
DIBENZO(A,H) ANTHRAC	6	0	0	6	0	0	.	.	.	0	0	0
INDENO(1,2,3-C,D) PY	6	0	0	6	0	0	.	.	.	0	0	0
BENZO(B) CHRYSENE	6	0	0	6	0	0	.	.	.	0	0	0
CORONENE	6	0	0	6	0	0	.	.	.	0	0	0
*TOTAL SCAN PAH	102	0	0	102	0	0	0	0	0	0	0	0
PESTICIDES & PCB												
ALDRIN	5	0	0	5	0	0	5	0	0	6	0	0
ALPHA BHC	5	0	3	5	0	3	5	0	3	6	0	2
BETA BHC	5	0	0	5	0	0	5	0	0	6	0	0
LINDANE	5	0	1	5	0	0	5	0	0	6	0	1
ALPHA CHLORDANE	5	0	0	5	0	0	5	0	0	6	0	0
GAMMA CHLORDANE	5	0	0	5	0	0	5	0	0	6	0	0
DIELDRIN	5	0	0	5	0	0	5	0	0	6	0	0
METHOXYCHLOR	5	0	0	5	0	0	5	0	0	6	0	0
ENDOSULFAN 1	5	0	0	5	0	0	5	0	0	6	0	0
ENDOSULFAN II	5	0	0	5	0	0	5	0	0	6	0	0
ENDRIN	5	0	0	5	0	0	5	0	0	6	0	0
ENDOSULFAN SULPHATE	5	0	0	5	0	0	5	0	0	6	0	0
HEPTACHLOR EPOXIDE	5	0	0	5	0	0	5	0	0	6	0	0
HEPTACHLOR	5	0	0	5	0	0	5	0	0	6	0	0
MIREX	5	0	0	5	0	0	5	0	0	6	0	0
OXYCHLORDANE	5	0	0	5	0	0	5	0	0	6	0	0
OPDDT	5	0	0	5	0	0	5	0	0	6	0	0
PCB	5	0	0	5	0	0	5	0	0	6	0	0
DDD	5	0	0	5	0	0	5	0	0	6	0	0
PPDDE	5	0	0	5	0	0	5	0	0	6	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	5	0	0	5	0	0	5	0	0	6	0	0
AMETRINE	6	0	0	6	0	0	.	.	.	.	.	.
ATRAZINE	6	0	0	6	0	0	.	.	.	.	.	.
ATRATONE	6	0	0	6	0	0	.	.	.	.	.	.
CYANAZINE (BLADEX)	6	0	0	6	0	0	.	.	.	.	.	.
DESETHYLATRAZINE	6	0	0	6	0	0	.	.	.	.	.	.
D-ETHYL SIMAZINE	6	0	0	6	0	0	.	.	.	.	.	.
PROMETONE	6	0	0	6	0	0	.	.	.	.	.	.
PROPAZINE	6	0	0	6	0	0	.	.	.	.	.	.
PROMETRYNE	6	0	0	6	0	0	.	.	.	.	.	.
METRIBUZIN (SENCOR)	6	0	0	6	0	0	.	.	.	.	.	.
SIMAZINE	6	0	0	6	0	0	.	.	.	.	.	.
ALACHLOR (LASSO)	6	0	0	6	0	0	.	.	.	.	.	.
METOLACHLOR	6	0	0	6	0	0	.	.	.	.	.	.
HEXACLCYCLOPENTADIEN	1	0	0	2	0	0	2	1	0	2	1	0
*TOTAL SCAN PESTICIDES & PCB	184	0	4	185	0	3	107	1	3	128	1	3
PHENOLICS												
PHENOLICS	6	2	3	6	3	2	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	6	2	3	6	3	2	0	0	0	0	0	0
SPECIFIC PESTICIDES												
TOXAPHENE	5	0	0	5	0	0	5	0	0	6	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.	.	.	.
2,4-D	2	0	0	2	0	0	.	.	.	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.	.	.	.
DICAMBA	2	0	0	2	0	0	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.	.	.	.
ETHION	2	0	0	2	0	0	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
PHORATE	1	0	0	1	0	0	.	.	.	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
BENONYL	0	0	0	0	0	0	.	.	.	.	.	.
BUX	0	0	0	0	0	0	.	.	.	.	.	.
CARBOFURAN	2	0	0	2	0	0	.	.	.	.	.	.
CICP	2	0	0	2	0	0	.	.	.	.	.	.
DIALLATE	2	0	0	2	0	0	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	2	0	0	2	0	0	.	.	.	.	.	.
IPC	2	0	0	2	0	0	.	.	.	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.	.	.	.
CARBARYL	2	0	0	2	0	0	.	.	.	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	56	0	0	56	0	0	5	0	0	6	0	0
VOLATILES												
BENZENE	6	0	0	6	0	1	5	0	0	6	0	0
TOLUENE	6	0	0	6	0	2	5	0	1	6	0	1
ETHYLBENZENE	6	0	1	6	0	3	5	0	0	6	0	3
P-XYLENE	6	0	0	6	0	0	5	0	0	6	0	0
M-XYLENE	6	0	0	6	0	0	5	0	0	6	0	0
O-XYLENE	6	0	0	6	0	1	5	0	0	6	0	0
STYRENE	6	0	1	6	0	0	5	0	2	6	0	4
1,1 DICHLOROETHYLENE	6	0	0	6	0	0	5	0	0	6	0	0
METHYLENE CHLORIDE	6	0	0	6	0	0	5	0	0	6	0	0
T1,2DICHLOROETHYLENE	6	0	0	6	0	0	5	0	0	6	0	0
1,1 DICHLOROETHANE	6	0	0	6	0	0	5	0	0	6	0	0
CHLOROFORM	6	0	2	6	6	0	5	5	0	6	6	0
111, TRICHLOROETHANE	6	0	1	6	0	0	5	0	0	6	0	0
1,2 DICHLOROETHANE	6	0	0	6	0	0	5	0	0	6	0	0
CARBON TETRACHLORIDE	6	0	0	6	0	0	5	0	0	6	0	0
1,2 DICHLOROPROPANE	6	0	0	6	0	0	5	0	0	6	0	0
TRICHLOROETHYLENE	6	0	0	6	0	0	5	0	0	6	0	0
DICHLOROBROMOMETHANE	6	0	0	6	6	0	5	5	0	6	6	0
112 TRICHLOROETHANE	6	0	0	6	0	0	5	0	0	6	0	0
CHLORODIBROMOMETHANE	6	0	0	6	0	6	5	0	5	6	0	6
T-CHLOROETHYLENE	6	0	0	6	0	0	5	0	0	6	0	0
BROMOFORM	6	0	0	6	0	0	5	0	0	6	0	0
1122 T-CHLORDETHANE	6	0	0	6	0	0	5	0	0	6	0	0
CHLOROBENZENE	6	0	0	6	0	0	5	0	0	6	0	0
1,4 DICHLOROBENZENE	6	0	0	6	0	0	5	0	0	6	0	0
1,3 DICHLOROBENZENE	6	0	0	6	0	0	5	0	0	6	0	0
1,2 DICHLOROBENZENE	6	0	0	6	0	0	5	0	0	6	0	0
ETHLYENE DIBROMIDE	6	0	0	6	0	0	5	0	0	6	0	0
TOTL TRIHALOMETHANES	6	0	0	6	6	0	5	5	0	6	6	0
*TOTAL SCAN VOLATILES	174	0	5	174	18	13	145	15	8	174	18	14
*TOTAL GROUP ORGANIC	604	2	12	605	21	18	327	16	11	392	19	17

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
- 1. Maximum Acceptable Concentration (MAC)
- 1+. MAC for Total Trihalomethanes
- 2. Interim Maximum Acceptable Concentration (IMAC)
- 3. Aesthetic Objective (AO)
- 3*. AO for Total Xylenes
- 4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
- 1. Maximum Acceptable Concentration (MAC)
- 2. Proposed MAC
- 3. Interim MAC
- 4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
- 1. Guideline Value (GV)
- 2. Tentative GV
- 3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
- 1. Maximum Contaminant Level (MCL)
- 2. Suggested No-Adverse Effect Level (SNAEL)
- 3. Lifetime Health Advisory
- 4. EPA Ambient Water Quality Criteria
- 4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
- 1. Health Related Guideline Level
- 2. Aesthetic Guideline Level
- 3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR		Unreliable: Could Not Confirm By Reanalysis
UCS		Unreliable: Contamination Suspected
UIN		Unreliable: Indeterminate Interference
XP		Positive After X Number Of Hours
T#	(T06)	Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL						
FECAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 0 (A1)		
FEB	26	.	.	.	.	.
APR	!LA	.	.	.	.	.
JUN	4	.	.	.	.	.
AUG	32	.	.	.	.	.
OCT	12	.	.	.	.	.
DEC	BDL	.	.	.	.	.
STANDRD PLATE CNT MF (COUNT/ML)			DET'N LIMIT = 0	GUIDELINE = 500/ML (A3)		
FEB	.	1 <=>	.	0 <=>	.	0 <=>
APR	.	2 <=>	.	1 <=>	.	3 <=>
JUN	.	7 <=>	.	1 <=>	.	9 <=>
AUG	.	0 <=>	.	.	.	20
OCT	.	4 <=>	.	0 <=>	.	12
DEC	.	2 <=>	.	0 <=>	.	1 <=>
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 5/100ML(A1)		
FEB	1100	.	.	.	.	.
APR	20 <=>	.	.	.	.	.
JUN	230	.	.	.	.	.
AUG	2100	.	.	.	.	.
OCT	100 <=>	.	.	.	.	.
DEC	70 <=>	.	.	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = N/A		
FEB	14000	.	.	.	.	.
APR	21000	.	.	.	.	.
JUN	16000	.	.	.	.	.
AUG	40000 >	.	.	.	.	.
OCT	70000	.	.	.	.	.
DEC	9500	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)						
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
FEB	.	.210	.200	.200	.300	.200
APR	.	.230	.600	.200	.100	.100
JUN	.	.240	.600	.400	.100	.100
AUG	.	.270	.	.	.000	.100
OCT	.	.240	.600	.400	.100	.100
DEC	.	.230	.400	.400	.100	.100
FLD CHLORINE FREE (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
FEB	.	1.240	.500	1.300	.200	.300
APR	.	1.270	.500	1.300	.100	.100
JUN	.	1.250	.500	1.300	.100	.100
AUG	.	1.180	.	.	.100	.100
OCT	.	1.160	.300	1.300	.200	.100
DEC	.	1.270	.700	.900	.100	.300
FLD CHLORINE (TOTAL) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
FEB	.	1.450	.700	1.500	.100	.100
APR	.	1.500	1.100	1.500	.200	.200
JUN	.	1.490	1.100	1.700	.200	.200
AUG	.	1.450	.	.	.100	.200
OCT	.	1.400	.900	1.700	.300	.200
DEC	.	1.500	1.100	1.300	.200	.400
FLD PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
FEB	7.800	6.900	7.200	7.200	7.000	7.000
APR	7.750	6.950	7.200	7.000	7.200	7.000
JUN	7.700	6.500	7.200	7.200	6.900	6.900
AUG	7.850	6.550	.	.	7.000	6.800
OCT	7.750	6.800	7.400	7.200	7.200	7.000
DEC	7.700	6.700	7.200	7.200	7.000	7.000
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)		
FEB	.600	.500	11.500	2.000	20.000	5.500
APR	2.800	2.800	15.000	5.500	18.500	7.000
JUN	17.800	17.900	18.000	17.000	20.500	14.500
AUG	24.000	24.000	.	.	21.000	20.500
OCT	15.000	14.800	17.000	16.000	20.000	17.000
DEC	1.200	1.200	16.000	9.000	20.000	9.000
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1 (A1)		
FEB	.370	.200	.210	.180	.400	.300
APR	.680	.100	.260	.140	.450	.500
JUN	.960	.100	.280	.200	.440	.
AUG	.810	.130	.	.	.360	.370
OCT	1.100	.300	.360	.320	.380	.300
DEC	.520	.360	.340	.350	.410	.400

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)						
ALKALINITY (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 30-500 (A4)	
FEB	87.600	62.700	63.100	65.400	65.900	65.200
APR	80.300	62.200	61.200	59.100	68.100	68.400
JUN	84.000	59.600	61.600	61.400	63.400	63.000
AUG	84.000	59.500	.	.	63.400	62.200
OCT	76.000	60.700	61.600	60.100	62.600	62.000
DEC	78.300	63.500	63.000	64.500	63.400	62.700
CALCIUM (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 100 (F2)	
FEB	37.000	37.000	36.800	37.000	36.800	36.800
APR	34.200	34.200	34.600	34.400	35.200	34.800
JUN	35.600	35.000	35.200	35.400	35.800	35.800
AUG	35.400	35.100	.	.	36.100	36.500
OCT	30.200	29.800	30.000	30.600	30.800	30.800
DEC	34.700	33.800	34.500	34.600	34.900	34.700
CHLORIDE (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 250 (A3)	
FEB	8.600	11.500	11.800	11.600	12.000	11.600
APR	8.800	12.500	12.600	12.400	13.100	12.900
JUN	8.500	12.900	13.200	12.900	13.100	13.000
AUG	7.100	11.700	.	.	11.400	12.100
OCT	7.200	11.700	11.900	11.600	11.700	11.300
DEC	7.000	10.900	11.400	11.200	11.300	11.100
COLOUR (HZU)			DET'N LIMIT = 0.5		GUIDELINE = 5 (A3)	
FEB	19.000	3.000	4.500	4.500	8.000	7.500
APR	17.500	2.000 <T	2.500	2.000 <T	7.000	7.000
JUN	17.000	2.500	3.500	3.500	6.500	7.000
AUG	13.000	2.000 <T	.	.	4.000	4.000
OCT	11.500	3.500	4.000	3.500	4.500	4.000
DEC	13.500	4.000	5.000	5.000	7.000	17.500
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.		GUIDELINE = 400 (F2)	
FEB	227	234	236	232	241	234
APR	215	224	225	224	240	226
JUN	214	229	230	228	231	229
AUG	208	221	.	.	227	224
OCT	193	202	205	201	209	203
DEC	198	207	208	207	211	206
DISS ORG CARBON (MG/L)			DET'N LIMIT = .100		GUIDELINE = 5.0 (A3)	
FEB	5.800	3.800	3.800	4.000	3.800	3.800
APR	5.500	3.500	3.400	3.100	3.700	4.300
JUN	5.300	3.600	4.000	3.700	3.400	3.300
AUG	5.000	3.500	.	.	3.200	3.100
OCT	5.200	4.600	4.400	4.500	3.800	3.900
DEC	5.400	4.400	4.700	4.400	4.400	4.300

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
FLUORIDE (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 2.4 (A1)		
FEB	.040 <T	.920	1.140	1.120	1.020	1.000
APR	.040 <T	1.120	1.120	1.180	.860	1.000
JUN	.060	1.140	1.120	1.140	1.040	1.040
AUG	.080	.760	.	.	.780	.740
OCT	.060	1.100	.940	1.000	.900	.880
DEC	.060	1.040	1.180	1.040	1.220	1.120
HARDNESS (MG/L)			DET'N LIMIT = 0.5	GUIDELINE = 80-100 (A4)		
FEB	108.000	108.000	107.000	108.000	107.000	107.000
APR	99.000	98.000	100.000	99.000	102.000	101.000
JUN	102.000	101.000	101.000	102.000	102.000	102.000
AUG	101.600	100.800	.	.	103.300	104.000
OCT	89.000	88.000	88.000	90.000	91.000	90.000
DEC	99.900	97.300	99.000	99.400	100.000	99.800
IONCAL (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
FEB	3.153	6.736	6.557	6.357	4.167	6.047
APR	2.494	5.204	4.741	6.139	2.175	4.991
JUN	1.955	2.005	2.561	3.377	2.124	3.081
AUG	7.121	7.953	.	.	7.789	8.345
OCT	2.024	2.408	1.115	5.007	2.428	3.229
DEC	9.118	7.459	9.777	9.651	10.190	10.560
LANGELIERS INDEX (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
FEB	.340	.072	.082	.081	.069	.047
APR	.173	-.221	-.084	-.141	-.086	-.074
JUN	.210	-.492	-.266	-.274	-.346	-.358
AUG	.260	-.548	.	.	-.411	-.553
OCT	.084	-.503	-.325	-.406	-.338	-.370
DEC	.205	-.161	-.126	-.124	-.099	-.175
MAGNESIUM (MG/L)			DET'N LIMIT = 0.10	GUIDELINE = 30 (F2)		
FEB	3.700	3.800	3.700	3.700	3.800	3.700
APR	3.300	3.200	3.200	3.200	3.300	3.400
JUN	3.100	3.100	3.100	3.200	3.200	3.100
AUG	3.200	3.200	.	.	3.200	3.150
OCT	3.200	3.300	3.300	3.300	3.400	3.200
DEC	3.200	3.100	3.150	3.200	3.100	3.150
SODIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 200 (A4)		
FEB	4.600	4.800	5.600	4.400	4.400	4.600
APR	4.600	4.600	4.600	4.600	4.800	4.800
JUN	4.000	3.800	4.400	4.000	4.000	4.000
AUG	4.600	4.400	.	.	4.600	4.400
OCT	4.200	4.400	4.200	4.200	4.000	4.200
DEC	3.600	3.400	3.800	4.000	3.800	3.300

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)		
FEB	.028	BDL	.002 <T	BDL	.548	BDL
APR	.012	BDL	BDL	BDL	.650	BDL
JUN	.024	BDL	.004 <T	.002 <T	.004 <T	BDL
AUG	.026	.006 <T	.	.	.132	.014
OCT	.038	.014	.012	.008 <T	.382	.012
DEC	.018	.002 <T	.014	.002 <T	.244	.002 <T
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)		
FEB	.003 <T	BDL	BDL	.004 <T	.006	.005
APR	.005	BDL	.001 <T	BDL	.002 <T	.001 <T
JUN	.007	BDL	.001 <T	.001 <T	.001 <T	.001 <T
AUG	.002 <T	.001 <T	.	.	.002 <T	.002 <T
OCT	.001 <T	.001 <T	.001 <T	.001 <T	.001 <T	.001 <T
DEC	.002 <T	BDL	.001 <T	BDL	.001 <T	.001 <T
TOTAL NITRATES (MG/L)			DET'N LIMIT = 0.05	GUIDELINE = 10 (A1)		
FEB	.165	.160	.175	.165	.890	.170
APR	.265	.255	.265	.255	1.050	.255
JUN	.120	.115	.130	.120	.125	.120
AUG	.030	.025	.	.	.235	.020 <T
OCT	.015 <T	.010 <T	.205	.010 <T	.480	.015 <T
DEC	.045	.045	.055	.050	.435	.050
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
FEB	.390	.210	.310	.240	.870	.250
APR	.150	.120	.250	.170	1.030	.300
JUN	.410	.230	.330	.250	.240	.220
AUG	.400	.240	.	.	.390	.260
OCT	.380	.410	.790	.390	.680	.530
DEC	.330	.230	.340	.230	.530	.230
PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
FEB	8.240	8.120	8.130	8.110	8.100	8.080
APR	8.140	7.860	8.000	7.960	7.950	7.960
JUN	8.140	7.600	7.810	7.800	7.710	7.700
AUG	8.190	7.540	.	.	7.640	7.500
OCT	8.120	7.640	7.810	7.730	7.780	7.750
DEC	8.170	7.910	7.940	7.930	7.960	7.890
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = 0.0005	GUIDELINE = N/A		
FEB	BDL	.000 <T	.	.	.	.
APR	.002 <T	.003	.	.	.	.
JUN	BDL	.003	.	.	.	.
AUG	.001 <T	.002	.	.	.	.
OCT	BDL	.003	.	.	.	.
DEC	.000 <T	.001 <T	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = .40 (F2)		
FEB	.008 <T	.005 <T	.	.	.	.
APR	.003 <T	BDL	.	.	.	.
JUN	.011	.005 <T	.	.	.	.
AUG	.015	.006 <T	.	.	.	.
OCT	.008 <T	.010	.	.	.	.
DEC	.002 <T	BDL	.	.	.	.
SULPHATE (MG/L)			DET'N LIMIT = .200	GUIDELINE = 500 (A3)		
FEB	13.180	30.180	30.270	26.660	27.100	27.090
APR	12.150	21.530	23.660	24.210	20.580	17.750
JUN	11.370	26.940	25.700	25.550	25.550	24.720
AUG	9.650	25.120	.	.	24.220	24.590
OCT	9.260	17.340	16.750	17.190	17.020	17.410
DEC	9.900	17.500	17.800	17.500	17.300	17.300
TURBIDITY (FTU.)			DET'N LIMIT = 0.05	GUIDELINE = 1 (A1)		
FEB	2.100	.540	.380	.830	1.100	1.100
APR	1.580	.340	.400	.300	.990	.970
JUN	1.100	.350	.550	.350	.700	.750
AUG	1.300	.290	.	.	.710	.720
OCT	1.100	.430	.840	.560	.530	.560
DEC	1.500	1.390	.950	1.270	1.520	1.370

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
METALS						
SILVER (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A1)		
FEB	BDL	BDL	BDL	BDL	BDL	BDL
APR	BDL	.070 <T	.060 <T	.070 <T	BDL	BDL
JUN	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	.	.	BDL	BDL
OCT	BDL	BDL	.190 <T	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)		
FEB	11.000	210.000	140.000	240.000	140.000	160.000
APR	16.000	61.000	57.000	32.000	66.000	170.000
JUN	13.000	93.000	120.000	100.000	110.000	18.000
AUG	12.000	100.000	.	.	66.000	68.000
OCT	8.600	220.000	220.000	210.000	180.000	180.000
DEC	8.200	450.000	330.000	350.000	7.800	2.100
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)		
FEB	.120 <T	.660 <T	.460 <T	.760 <T	.730 <T	.560 <T
APR	.290 <T	.410 <T	.690 <T	.650 <T	.510 <T	.530 <T
JUN	.320 <T	.540 <T	.390 <T	.520 <T	.480 <T	.540 <T
AUG	.250 <T	.580 <T	.	.	.490 <T	.400 <T
OCT	.380 <T	.850 <T	.680 <T	.580 <T	.650 <T	.560 <T
DEC	.350 <T	.830 <T	.510 <T	.610 <T	.290 <T	.290 <T
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)		
FEB	34.000	33.000	36.000	33.000	37.000	34.000
APR	27.000	27.000	28.000	27.000	29.000	26.000
JUN	29.000	28.000	28.000	32.000	31.000	11.000
AUG	29.000	28.000	.	.	29.000	29.000
OCT	28.000	27.000	27.000	26.000	26.000	26.000
DEC	27.000	26.000	26.000	25.000	7.500	7.800
BORON (UG/L)			DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)		
FEB	10.000 <T	10.000 <T	12.000 <T	11.000 <T	11.000 <T	11.000 <T
APR	9.000 <T	17.000 <T	19.000 <T	8.100 <T	9.100 <T	7.800 <T
JUN	14.000 <T	13.000 <T	14.000 <T	17.000 <T	17.000 <T	13.000 <T
AUG	14.000 <T	15.000 <T	.	.	14.000 <T	9.100 <T
OCT	9.000 <T	12.000 <T	11.000 <T	9.200 <T	12.000 <T	10.000 <T
DEC	17.000 <T	16.000 <T	17.000 <T	17.000 <T	9.900 <T	7.500 <T
CADMIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
FEB	BDL	BDL	BDL	BDL	.100 <T	BDL
APR	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	.110 <T	.090 <T	BDL	BDL
AUG	BDL	BDL	.	.	BDL	BDL
OCT	BDL	BDL	BDL	BDL	.090 <T	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
COBALT (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
FEB	.160 <T	.210 <T	.150 <T	.160 <T	.120 <T	.090 <T
APR	.050 <T	.170 <T	.070 <T	.090 <T	.160 <T	.040 <T
JUN	.050 <T	BDL	BDL	.210 <T	.080 <T	.090 <T
AUG	BDL	BDL	.	.	BDL	BDL
OCT	.070 <T	.070 <T	.840 <T	.060 <T	.110 <T	.060 <T
DEC	.100 <T	.170 <T	.150 <T	.110 <T	BDL	.030 <T
CHROMIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)		
FEB	BDL	1.800 <T	1.400 <T	1.900 <T	1.300 <T	1.700 <T
APR	BDL	2.300 <T	2.600 <T	1.100 <T	.740 <T	.710 <T
JUN	1.500 <T	2.300 <T	1.700 <T	2.900 <T	3.100 <T	1.700 <T
AUG	1.100 <T	1.400 <T	.	.	1.800 <T	BDL
OCT	BDL	2.300 <T	1.100 <T	1.300 <T	2.300 <T	1.600 <T
DEC	1.800 <T	2.900 <T	2.400 <T	2.600 <T	BDL	BDL
COPPER (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 1000 (A3)		
FEB	4.000 <T	1.100 <T	360.000	26.000	570.000	39.000
APR	3.700 <T	BDL	190.000	20.000	260.000	25.000
JUN	7.100	.550 <T	300.000	230.000	30.000	1.200 <T
AUG	4.100 <T	.580 <T	.	.	230.000	34.000
OCT	5.100	BDL	160.000	29.000	190.000	29.000
DEC	4.800 <T	1.200 <T	220.000	32.000	15.000	8.000
IRON (UG/L)			DET'N LIMIT = 6.00	GUIDELINE = 300 (A3)		
FEB	41.000 <T	6.500 <T	13.000 <T	17.000 <T	200.000	200.000
APR	55.000 <T	BDL	BDL	BDL	200.000	170.000
JUN	32.000 <T	BDL	6.700 <T	180.000	210.000	22.000 <T
AUG	40.000 <T	17.000 <T	.	.	74.000	85.000
OCT	27.000 <T	7.800 <T	11.000 <T	14.000 <T	64.000	52.000 <T
DEC	30.000 <T	19.000 <T	18.000 <T	19.000 <T	BDL	BDL
MERCURY (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 1 (A1)		
FEB	BDL	BDL	.	.	.	.
APR	BDL	BDL	.	.	.	.
JUN	.040 <T	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	.	.	.
MANGANESE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A3)		
FEB	9.700	2.700	3.600	3.000	14.000	11.000
APR	9.800	.890	1.800	1.100	10.000	8.700
JUN	19.000	1.100	2.800	9.600	15.000	2.700
AUG	22.000	.760	.	.	16.000	15.000
OCT	18.000	1.200	6.400	1.900	9.000	8.200
DEC	6.300	1.400	1.800	1.400	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
FEB	.320 <T	.320 <T	.290 <T	.300 <T	.280 <T	.270 <T
APR	.200 <T	.160 <T	.150 <T	.160 <T	.220 <T	.100 <T
JUN	.320 <T	.310 <T	.260 <T	.210 <T	.140 <T	.120 <T
AUG	.230 <T	.230 <T	.	.	.220 <T	.200 <T
OCT	.220 <T	.230 <T	.370 <T	.220 <T	.230 <T	.230 <T
DEC	.310 <T	.270 <T	.250 <T	.260 <T	.700	.300 <T
NICKEL (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)		
FEB	4.800	1.900 <T	11.000	1.600 <T	5.500	1.800 <T
APR	BDL	BDL	.420 <T	BDL	1.300 <T	BDL
JUN	BDL	BDL	4.300	1.800 <T	BDL	BDL
AUG	BDL	BDL	.	.	BDL	BDL
OCT	BDL	BDL	800.000	BDL	6.200	BDL
DEC	BDL	BDL	13.000	BDL	BDL	BDL
LEAD (UG/L .)			DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)		
FEB	.200 <T	.140 <T	6.700	.780	14.000	.760
APR	.130 <T	BDL	4.900	.690	8.300	.620
JUN	.320 <T	BDL	7.200	7.100	1.000	.080 <T
AUG	.160 <T	BDL	.	.	9.200	1.400
OCT	.130 <T	.090 <T	5.500	1.300	6.700	.880
DEC	.140 <T	.070 <T	4.900	1.000	.760	.850
ANTIMONY (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)		
FEB	.390 <T	.480 <T	.620	.530	.850	.580
APR	.370 <T	.320 <T	.460 <T	.380 <T	.600	.400 <T
JUN	.470 <T	.300 <T	.460 <T	.650	.610	.330 <T
AUG	.490 <T	.430 <T	.	.	.660	.380 <T
OCT	.330 <T	.390 <T	.410 <T	.290 <T	.560	.600
DEC	.320 <T	.400 <T	.480 <T	.330 <T	1.100	.900
SELENIUM (UG/L)			DET'N LIMIT = 1.00	GUIDELINE = 10 (A1)		
FEB	BDL	BDL	BDL	BDL	BDL	BDL
APR	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	.	.	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	1.200 <T	BDL	1.400 <T	BDL
STRONTIUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = N/A		
FEB	140.000	140.000	140.000	150.000	150.000	150.000
APR	110.000	110.000	110.000	110.000	110.000	110.000
JUN	110.000	110.000	110.000	100.000	100.000	23.000
AUG	110.000	100.000	.	.	100.000	110.000
OCT	100.000	100.000	100.000	99.000	100.000	99.000
DEC	110.000	110.000	100.000	100.000	44.000	46.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
TITANIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = N/A		
FEB	8.100	6.300	6.600	6.800	7.200	7.400
APR	4.100 <T	4.100 <T	4.500 <T	4.400 <T	4.800 <T	4.500 <T
JUN	4.600 <T	5.500	6.900	4.800 <T	4.500 <T	5.500
AUG	7.900	8.300	.	.	7.600	8.900
OCT	3.100 <T	3.400 <T	3.200 <T	3.500 <T	3.400 <T	3.100 <T
DEC	1.900 <T	2.400 <T	2.000 <T	2.000 <T	1.200 <T	.980 <T
URANIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)		
FEB	.160 <T	.100 <T	.090 <T	.080 <T	.080 <T	.100 <T
APR	.170 <T	.080 <T	BDL	BDL	.080 <T	.100 <T
JUN	.150 <T	.060 <T	BDL	.060 <T	.060 <T	BDL
AUG	.170 <T	BDL	.	.	BDL	.080 <T
OCT	.140 <T	.130 <T	.140 <T	.140 <T	.120 <T	.130 <T
DEC	.190 <T	.200 <T	.150 <T	.160 <T	.080 <T	.070 <T
VANADIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
FEB	.430 <T	1.900	2.100	2.100	1.400	1.600
APR	.200 <T	.960	1.100	1.200	.870	.710
JUN	.290 <T	1.300	1.100	.830	.830	.250 <T
AUG	.410 <T	1.200	.	.	.540	.650
OCT	.410 <T	1.200	1.100	1.100	.730	.730
DEC	.110 <T	.810	.770	.760	.300 <T	.380 <T
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)		
FEB	2.800	2.400	120.000	4.000	150.000	3.500
APR	1.500 <T	1.000 <T	44.000	2.400	36.000	1.800 <T
JUN	4.400	1.800 <T	92.000	30.000	3.400	3.800
AUG	1.600 <T	1.200 <T	.	.	37.000	3.700
OCT	1.800 <T	8.600	70.000	18.000	27.000	2.800
DEC	3.000	5.400	76.000	5.900	.420 <T	.630 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS 1990

		WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
		RAW	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROAROMATICS							
HEXACHLOROCYCLOPENTADIENE (NG/L)				DET'N LIMIT = 5.000		GUIDELINE = 206000 (D4)	
OCT	BDL	BDL		.	550.000	.	555.000
DEC	!IS	BDL		.	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PESTICIDES & PCB						
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (G)		
FEB	1.000 <T	1.000 <T	.	1.000 <T	.	1.000 <T
APR	2.000 <T	1.000 <T	.	2.000 <T	.	BDL
JUN	2.000 <T	4.000 <T	.	4.000 <T	.	3.000 <T
AUG	BDL	!LA	.	.	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	!IS	BDL	.	BDL	.	BDL
LINDANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 4000 (A1)		
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
JUN	2.000 <T	BDL	.	BDL	.	1.000 <T
AUG	BDL	!LA	.	.	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	!IS	BDL	.	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS (UG/L)			DET'N LIMIT = .200	GUIDELINE = 2 (A4)		
FEB	1.000	1.000	.	.	.	.
APR	.600 <T	1.000	.	.	.	.
JUN	BDL	BDL	.	.	.	.
AUG	.600 <T	.400 <T	.	.	.	.
OCT	.600 <T	1.000 <T	.	.	.	.
DEC	1.200	1.000	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES						
BENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	.100 <T	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	.	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
TOLUENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)		
FEB	BDL	.050 <T	.	.050 <T	.	.050 <T
APR	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	.	.	BDL
OCT	BDL	.050 <T	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)		
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	.100 <T	.	BDL	.	.150 <T
JUN	BDL	BDL	.	BDL	.	BDL
AUG	BDL	.050 <T	.	.	.	.050 <T
OCT	BDL	.050 <T	.	BDL	.	BDL
DEC	.100 <T	BDL	.	BDL	.	.050 <T
O-XYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)		
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	.050 <T	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	.	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)		
FEB	BDL	BDL	.	.100 <T	.	.100 <T
APR	BDL	BDL	.	BDL	.	.200 <T
JUN	BDL	BDL	.	.050 <T	.	BDL
AUG	BDL	BDL	.	.	.	.050 <T
OCT	BDL	BDL	.	BDL	.	BDL
DEC	.150 <T	BDL	.	BDL	.	.050 <T
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
FEB	BDL	95.800	.	106.200	.	82.700
APR	BDL	111.400	.	110.000	.	109.400
JUN	BDL	145.000	.	156.300	.	126.800
AUG	.100 <T	134.200	.	.	.	118.000
OCT	BDL	111.600	.	108.900	.	93.800
DEC	.100 <T	87.500	.	91.700	.	76.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PETERBOROUGH WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
111, TRICHLOROETHANE (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 200 (D1)		
FEB	BDL	BDL	.	BDL	.	BDL
APR	.040 <T	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	.	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)		
FEB	BDL	5.850	.	6.250	.	5.050
APR	BDL	5.100	.	4.800	.	4.950
JUN	BDL	5.700	.	6.050	.	5.200
AUG	BDL	6.600	.	.	.	6.200
OCT	BDL	6.100	.	6.050	.	5.550
DEC	BDL	5.700	.	5.900	.	5.150
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
FEB	BDL	.200 <T	.	.200 <T	.	.100 <T
APR	BDL	.200 <T	.	.100 <T	.	.100 <T
JUN	BDL	.100 <T	.	.100 <T	.	.100 <T
AUG	BDL	.100 <T	.	.	.	.100 <T
OCT	BDL	.200 <T	.	.200 <T	.	.200 <T
DEC	BDL	.200 <T	.	.200 <T	.	.100 <T
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 350 (A1)		
FEB	BDL	101.800	.	112.600	.	87.850
APR	BDL	116.700	.	114.900	.	114.450
JUN	BDL	150.850	.	162.500	.	132.150
AUG	BDL	140.900	.	.	.	124.300
OCT	BDL	117.950	.	115.100	.	99.550
DEC	BDL	93.350	.	97.750	.	81.250

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
BACTERIOLOGICAL				
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0	(A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML	(A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A	
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML	(A1)
CHEMISTRY (FLD)				
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD PH	DMNSLESS	N/A	6.5-8.5	(A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0	(A3)
FIELD TURBIDITY	FTU	N/A	1.0	(A1)
CHEMISTRY (LAB)				
ALKALINITY	MG/L	0.2	30-500	(A3)
AMMONIUM TOTAL	MG/L	0.002	0.05	(F2)
CALCIUM	MG/L	0.2	100	(F2)
CHLORIDE	MG/L	0.2	250	(A3)
COLOUR	TCU	0.5	5.0	(A3)
CONDUCTIVITY	UMHO/CM	1.0	400	(F2)
CYANIDE	MG/L	0.001	0.2	(A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0	(A3)
FLUORIDE	MG/L	0.01	2.4	(A1)
HARDNESS	MG/L	0.5	80-100	(A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A	
MAGNESIUM	MG/L	0.1	30.0	(F2)
NITRITE	MG/L	0.001	1.0	(A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A	
PH	DMNSLESS	N/A	6.5-8.5	(A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A	
PHOSPHORUS TOTAL	MG/L	0.002	0.4	(F2)
SODIUM	MG/L	0.2	200	(A4)
SULPHATE	MG/L	0.2	500	(A3)
TOTAL NITRATES	MG/L	0.005	10.0	(A1)
TURBIDITY	FTU	0.05	1.0	(A1)
CHLOROAROMATICS				
123 TRICHLOROBENZENE	NG/L	5.0	N/A	
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A	
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A	
124 TRICHLOROBENZENE	NG/L	5.0	10000	(I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000	(D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A	
236 TRICHLOROTOLUENE	NG/L	5.0	N/A	
245 TRICHLOROTOLUENE	NG/L	5.0	N/A	
26A TRICHLOROTOLUENE	NG/L	5.0	N/A	
HEXACHLOROBENZENE	NG/L	1.0	10	(C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450	(D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000	(D4)
HEXACHLOROETHANE	NG/L	1.0	1900	(D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A	
PENTACHLOROBENZENE	NG/L	1.0	74000	(D4)
CHLOROPHENOLS				
234 TRICHLOROPHENOL	NG/L	100.0	N/A	
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A	
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A	

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NC/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P'-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY
All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: P0C0D0 UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:**NAME:** BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do not rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do not rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled

Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC) (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

<u>Steps:</u>

1. Record time of day on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

TD
380
.P48
1992

Peterborough water supply system : annual report 1990.
19367